Learning Objectives:

- Understand how research can lead to better preservation of wooden structures
- Identify methods and procedures used to analyze existing timber and lumber
- Make informed decisions regarding the structural capacity of existing wood framing that can facilitate the retention of historic fabric
- Choose wood preservatives based on conditions assessment and need
- Select appropriate primers to extend the lifetime of paint finishes on exterior wood

Preserving wooden building materials is critical to historic preservation practitioners. Wood as a building material is abundant in historic structures. Preservation of wood is often essential to the long-term survival of the structure and adds to the original character of the building. The Secretary of Interior's Standards for Preservation and Guidelines for Preserving Historic Buildings encourage stabilization, protection and maintaining wooden features of buildings. This four paper panel focuses ways to evaluate the condition of structural wood and ways to treat and preserve it.

The speakers are as follows:


Dugan will discuss the history of standards and lumber testing methods, as well as alternatives to destructive test procedures and the application of modern design values to historic timber. Often, when faced with the need to analyze historic structural timber framing, engineers apply an assumed species and grade to determine the adequacy of wood members to remain in service. Not uncommonly, these assumed species and grades show that the wood does not have sufficient capacity to meet modern codes and regulations. However, timber and lumber in historic buildings is typically old-growth material of a size, quality, and density that is significantly different from modern material. This presentation is designed to explain how modern design values were determined and how they can most effectively be used in structural analyses to retain historic fabric that may otherwise be removed or supplemented with costly structural reinforcements.

**Dave Woodham**, Atkinson-Noland and Associates, *Investigation of Liberty Bell Replica, Denver, Colorado*

Woodham will present a case study that investigates the wood and steel components that support the Bell. Because of weathering and distress, it was not known whether the current support system could adequately support the Bell over time, particularly if the intent is to be able to ring the Bell on historic occasions. The condition of the wooden yoke was assessed to determine wood species, identify the presence of any defects or deterioration that might affect the long-term performance of the Bell, and provide material input for the structural analysis. A finite element model of the bell support structure was developed to determine the stresses and...
deflections of the support structure under static and dynamic (ringing) conditions. As part of the assessment, digital radioscopy images of the Liberty Bell replica yoke were used to supplement findings on the wood and metal components. This information had not been collected on any other bell replica and was useful not only to the current investigation but the analysis and preservation of other Liberty Bell replicas.


Anthony reviews guidelines for the selection and application of wood preservatives to historic structures. Historic wooden structures are vulnerable to attack by decay and insects, making their long term preservation a challenge. Various preservative treatments can be used to help protect these structures. However, the optimal selection and application of preservatives is difficult because there are a wide range of structures types, as well as numerous and changing preservative formulations. In this presentation, topics include factors leading to deterioration; locations and circumstances where preservatives may (or may not) be beneficial; characteristics of and application guidelines for field treatment preservatives; and descriptions of pressure treatment preservatives. Additionally, Anthony will discuss a decision tree for selection of the appropriate type of pressure-treated wood when replacement is necessary.

Laura Lee Worrell and Carol Chin, NPS National Center for Preservation Technology and Training, *The Effectiveness of Paint Primers on Historic Exterior Wood*

Worrell will present recent results of a study comparing commercially available primers in the laboratory. Three nationally available primer brands were selected: Sherwin-Williams, Pittsburg Paints, and Zinsser primers. Five trials were conducted: oil-based primer with two coats of paint, acrylic-based primer with two coats of paint, wood conditioner with two coats of paint, two coats of all-in-one primer and paint combination, and one coat of paint. All primers received a Benjamin Moore paint top coat. All samples were evaluated by: mass measurements, glossmeter, colorimeter, Fourier transform infrared spectroscopy (FTIR), contact angle goniometer, scanning electron microscope (SEM), and QUV accelerated weathering tester. Additionally, a public survey of 20 individuals was used to evaluate appearance. The results of research indicated that the Zinsser brand of oil-based primer with two top coats of paint outperformed the other paints in terms of aesthetics and durability, making it the better choice for preserving historic exterior wood.

Mary F. Striegel NPS National Center for Preservation Technology and Training, will serve as session chair and moderator.